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KEEPING THE WHEELS TURNING:

MULTI-LEVEL DYNAMICS IN ORGANIZING NETWORKS OF PRACTICE*

Marlous Agterberg, Bart van den Hooff, Marleen Huysman and Maura Soekijad

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Marlous Agterberg is a PhD candidate at the VU University Amsterdam, Faculty of Economics and Business Administration. After obtaining her masters on organizational communication at the University of Amsterdam, she is now doing her PhD on managing knowledge sharing in geographically distributed organizations. More specifically her research focuses on how intra-firm (online) knowledge networks are organized and how they contribute to organizational learning.

Bart van den Hooff is an associate professor at the VU University Amsterdam, Faculty of Economics and Business Administration. His research focuses on issues concerning the management of knowledge sharing in organizations and networks. He has presented his work at international conferences and published in journals like *Information & Management*, *Communication Research*, *Information Processing & Management* and *Behaviour & Information Technology*.

Marleen Huysman is professor of business administration at the VU University Amsterdam. She coordinates a multi-disciplinary research group; 'Knowledge and Organization' that conducts research on the knowledge economy, knowledge based view of the region, knowledge transfer in strategic alliances, knowledge management, organizational learning and online communities. Marleen is (co-)author of several books on communities and knowledge management and has writes articles published in various international journals and books. Marleen has a master in sociology at Erasmus University Rotterdam and a PhD in economics at the VU University Amsterdam. She had research and teaching positions at Stanford University, Delft University of Technology and Harvard Business School.

Maura Soekijad is an Assistant Professor knowledge and organization in Business Administration at VU University Amsterdam. She wrote her doctoral dissertation on knowledge sharing professionals in cooperative multiparty alliances and she is currently involved in research on innovation networks in the construction industry. Her publications include papers in *Knowledge & Process Management* and *European Management Journal*, and a book-chapter on cooperation in an edited volume by Routledge.

**KEEPING THE WHEELS TURNING:
MULTI-LEVEL DYNAMICS IN ORGANIZING NETWORKS OF PRACTICE***

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ABSTRACT

This paper addresses organizing dynamics of intra-firm ‘networks of practice’ (NOPs). It unravels different dimensions that play a role in knowledge sharing within NOPs: (1) practice dimension; (2) social dimension; and (3) organizational dimension. Based on a unique interpretive case study, we ‘unpack’ each dimension and consider them as dynamic based on either positive or negative forces that influence knowledge sharing in NOPs. By introducing the metaphor of a cogwheel, we argue that maintaining continuation of a NOP involves the dynamics of three levels of embeddedness (1) embeddedness of the NOP in local practices; (2) social embeddedness of the network; and (3) organizational embeddedness of the network. This integrative framework of multi-level dynamics helps to further our understanding regarding the success and failures of organizing NOPs.

Keywords: Distributed Organizations; Knowledge Management; Networks of Practice, Organization, Practice-based learning, Social embeddedness.

INTRODUCTION

According to the practice-based perspective on knowledge, knowledge sharing transpires most effectively in informal settings in which people interact around their practices, such as Communities of Practice (COPs) (Brown and Duguid, 1991; Gherardi, 2000; 2001; Wenger, 1998). In our globalizing economy, knowledge is often dispersed across different locations, making such interaction possibly problematic. In this context, geographically dispersed networks, often referred to as Networks of Practice, are increasingly important (Brown and Duguid, 2001). Networks of practice (NOPs) are social networks with members who are not necessarily co-located but do engage in common practices (Brown and Duguid, 2001; Duguid, 2005; Tagliaventi and Mattarelli, 2006; Teigland, 2003; Vaast, 2004; Wasko and Faraj, 2005). The NOP concept has been discussed both within the context of business organizations (Ormrod et al., 2007; Tagliaventi and Mattarelli, 2006; Wasko and Faraj, 2005) and within environments outside formal hierarchical control (Faraj and Wasko, 2001; Grewal et al., 2006; Lee and Cole, 2003; Shah, 2006).

In this paper, we focus on intra-organizational NOPs that are involved in internal business processes. Although NOPs have raised quite some interest within organizations (see e.g. Collison and Parcell, 2001; Prokesch, 2000; Wenger et al., 2002; Pan and Leidner, 2003; Nielsen and Ciabuschi, 2003; Rumyantseva et al., 2006), many initiatives tend to fail (Voelpel, Dous and Davenport, 2005), which makes the question of how these NOPs are organized to maintain valuable continuation increasingly relevant. Our general aim is to illuminate the *dynamics* involved in keeping intra-firm NOPs active and valuable both to their members and to their institutional environments.

From the knowledge management literature we identify three dimensions that play a role in knowledge sharing in networks. First, practice-based theories of knowledge stress the importance of shared *practices* as enabler and stimulator of knowledge sharing. Secondly, social network literature indicates the importance of the *social context* in terms of interpersonal relations for the willingness and effectiveness of knowledge sharing. Thirdly, organization and management literature focuses on the role of *the organization* in stimulating knowledge sharing.

These three dimensions lack clear conceptualization, have not been specifically related to intra-firm NOPs before and have not been approached in an integrated manner. Therefore, with our study we more specifically aim to ‘unpack’ or unravel these three

dimensions in relation to intra-firm NOPs, illuminating what they entail and how they relate to knowledge sharing in NOPs. In the process, we show the particular dynamics within these dimensions, integrate them and show how they relate to the networks' organization and value. The main contribution of this study thus lies in its elucidation of the different dimensions that play a role in organizing knowledge sharing in a situation of geographically dispersed practices and, building on this, its identification of ways to safeguard valued continuation of NOPs.

In realizing this contribution, we take a theory building case study approach (Eisenhardt, 1989), in which we endeavour to generate theoretical assumptions regarding the various dimensions and dynamics to be taken into account when organizing intra-organizational NOPs. Central to this approach is a case study we conducted within an internationally operating development aid organization. Although theory building research should be "as close as possible to the ideal of no theory under consideration" (Eisenhardt, 1989, p. 536), Eisenhardt (1989) also points out that it makes no sense to pretend that such a process is embarked upon with a theoretical "blank slate". Instead it usually has a theoretical grounding in extant literature, from which a priori constructs are derived. Accordingly, this paper starts with a theoretical background on the various dimensions that play a role in organizing NOPs. Subsequently, we introduce our case study and present the central findings. Based on the literature and case study findings, we develop a framework for organizing NOPs that involves the dynamics of three levels of embeddedness: embeddedness of the NOP in local practices; social embeddedness of the network; and organizational embeddedness of the network. Each dynamic entails either positive or negative forces that together influence 'momentum' in NOPs.

DIMENSIONS OF NETWORKS OF PRACTICE

In the history of academic and managerial attention for knowledge management (KM), two generations can be identified. The first generation of KM conceptualized knowledge from an objectivist perspective, focusing strongly on the storage, transfer and retrieval of knowledge through information technologies (IT). The lack of academically and practically relevant results of this approach (Hislop, 2002; Ruggles, 1998; Swan et al., 1999) gave rise to the second generation of KM, which takes a more practice-based perspective. Here, knowledge is not simply an aggregate of information which can be de-coupled from its

context, but is inherently tacit and embedded in social and practical contexts. Increasing attention was accorded to the importance of practice in explaining issues of knowledge and organization (Brown and Duguid, 1991; 2001; Cook and Brown, 1999; Gherardi, 2000; Orlikowski, 2002; Wenger, 2000), focusing on the assumption that knowledge sharing takes place where practices are shared in a rich and meaningful way (Hislop, 2005).

In the practice-based perspective, groups of people with a shared practice (Communities or Networks of Practice) are considered appropriate vehicles for facilitating and stimulating knowledge creation and sharing (Hislop, 2002; Ruggles, 1998; Scarbrough and Swan, 2001). Where COPs, as originally described by Lave and Wenger (1991), are tightly-knit and self-organizing groups of (typically co-located) people working together on a shared practice, NOPs are larger, members are more geographically dispersed, having much looser ties and less frequent interaction, and their practices are not co-located (Brown and Duguid 2001; Landqvist and Teigland, 2005; Tagliaventi and Mattarelli 2006) which questions whether the same organizing principles apply to NOPs (Roberts, 2006). Literature on communities and networks of practice addresses three dimensions (1) practice, (2) social context and (3) organization, that are relevant for organizing intra-organizational networks of practice with the goal to share knowledge.

Practice

With a few notable exceptions (e.g. Olivera, 2000; Orlikowski, 2002; Sole and Edmonson 2002), the literature on distributed networks tends to ignore the contribution of knowledge shared in networks to daily work practices and vice versa. This is a serious shortcoming as in distributed settings, one cannot rely solely on the situated learning processes that occur as a natural consequence of daily work activities (Brown and Duguid 2001; Vaast, 2004). Local practices are likely to differ and consequently, shared practices on the network level can no longer be automatically assumed (Orlikowski, 2002; Sole and Edmonson, 2002; Tagliaventi and Mattarelli, 2006). The importance of practice for knowledge sharing thus changes from being a natural condition to being a possible threat: the lack of physical proximity easily leads to myopia of learning (Levinthal and March, 1993) where people focus on their local individual practices and are less likely to engage in networks to learn from experiences of others. This complicated nature of learning from distributed local practices might explain why so few studies on NOPs indeed address the practice-based

dimension of knowledge sharing. It might also explain why attempts to introduce NOPs often tend to fail (Voelpel et al., 2005).

Social context

How employees are connected to one another in networks of social relations also determines to what extent and in what way they can draw upon and contribute knowledge (Hansen, Mors and Løvås, 2005; Huysman and Wulf, 2005; Smith, Collins and Clark, 2005). In many studies, strong groups which are characterized by mutual trust, reciprocity and a commitment towards the same ends, have been found to affect the willingness (Adler and Kwon, 2002; Ardichvili, Page and Wentling, 2003; Nahapiet and Ghoshal, 1998; Faraj and Wasko, 2001) and the effectiveness (Gulati, 1998; Levin and Cross, 2004) of knowledge sharing.

The importance of social ties for knowledge sharing has been addressed while referring to the concepts of ‘social capital’ (Adler and Kwon, 2002; Nahapiet and Ghoshal, 1998) and ‘social embeddedness’ (Granovetter, 1985). Building on the work of Granovetter (1985), Gulati (1998) distinguishes two different dimensions of ‘social embeddedness’: relational embeddedness and structural embeddedness. Relational embeddedness stresses the role of direct cohesive ties as a mechanism for gaining valuable information and knowledge; ties that also lead to shared understandings and emulation of behavior (see also Uzzi, 1997). Structural embeddedness stresses the value of the structural positions that members have in a network (e.g., their centrality, weak and strong ties).

The social dimension of NOPs has been discussed by various authors (Brown and Duguid, 2001; Faraj and Wasko, 2000; Tagliaventi and Mattarelli, 2006; Wasko and Faraj, 2005; Wasko and Teigland, 2004) although again not in detail. A non-addressed issue is the challenge of building social ties in the absence of physical proximity – a major challenge for NOPs as physical encounters strengthen (or deteriorate) social embeddedness as is often found in studies on for example virtual teams (Hinds and Mortensen, 2005; Jarvenpaa and Leidner, 1999; Kotlarsky and Oshiri, 2005). Again, this lack of attention towards building social ties in the absence of physical proximity might explain the difficulties organizations face when organizing NOPs. We therefore aim to unravel how the social dimension relates to knowledge sharing in distributed NOPs.

Organization

As intra-organizational NOPs are usually the result of managerial decisions aimed at leveraging the knowledge potential in the organization, the relationship between network and formal organization poses a complex management dilemma. In the practice-based literature, the role of management tends to be reduced to activities such as stimulating and facilitating processes (Alvesson and Kärreman, 2001) or spotting and cultivating existing non-canonical COPs (Ciborra, 1996; Von Krogh, 1998; Wenger, 1998). Although COPs are characterized by self-organization (Lave and Wenger, 1991), such self-organization would be difficult - if not impossible - to accomplish in geographically dispersed contexts, where members are less likely to encounter one another in daily work and need (organizational) resources to meet and interact (Pan and Leidner, 2003; Vaast, 2004; Vaast, 2007). In return, organizations strive to have at least some influence on the networks in order to warrant a certain degree of organizational benefit in terms of organizational learning. However: *“the organic, spontaneous and informal nature of communities [or networks] makes them resistant to supervision and interference.”* (Wenger and Snyder, 2000, p. 140; in similar wording: Hislop 2005; Thompson, 2005). Apparently, distributed knowledge networks cannot sustain without management support - however, too much interference from management is likely to diminish the intrinsic motivations to participate in a knowledge network (Hislop, 2005). This points toward a dilemma concerning the manageability of COPs (Swan et al., 2002), which may be even more challenging in geographically dispersed NOPs (Vaast, 2004). Again, this management dilemma might explain the difficulties of keeping NOPs active. By unraveling the organization dimension we aim to provide more insight in the role of the organization in knowledge sharing in intra-firm NOPs.

In sum, knowledge sharing in intra-firm NOPs involves the following three dimensions: 1) Practice, 2) Social context and 3) Organization. In order to constitute a more solid theory on NOPs, and in particular on how to organize these networks, we need to have a more detailed understanding of what these dimensions imply in the context of distributed knowledge sharing and how they relate to each other such as that they contribute to more sustainable value of NOPs for knowledge sharing purposes. In the following paragraphs we will unpack these dimensions. Empirical insights from an interpretive case study on the use

of NOPs in an internationally operating organization will help to further develop the theoretic discussion.

CASE STUDY: INTRODUCTION AND METHOD

The case study concerns an international, geographically dispersed development aid organization, headquartered in the Netherlands, which we will call “The Development Organization (TDO)”. At the moment of study, 22 NOPs were formally acknowledged by the organization. In order to understand the dynamics within these networks, we conducted in-depth multi-method research during March and August 2006, with interviews as primary data source.

A total of 35 interviews, each approximately 60 minutes, were conducted with different members from the organization, worldwide – ranging from the board of directors to network leaders, from regional directors to network members. Atlas.ti was used as a software package to structure and code the fully transcribed interviews. If recording was not possible, as was the case with spontaneous informal interviews, we made notes during and right after the interview which also formed part of the coding process. With the concepts of practice, social context, and organization as sensitizing concepts in the back of our mind, we delved deeper into these concepts by means of open coding. Once no new codes emerged we switched to axial coding. The results of this coding can be found in table I to III.

In addition, two of the co-authors paid a site visit to Ouagadougou, Burkina Faso, the headquarters of one of five regions in which TDO advisors are active: West and Central Africa. During this visit, we made observations at TDO’s local offices, visited a client NGO and acted as participant observers at meetings of several networks active in the region. Moreover, while staying at the same hotel as many TDO employees who visited the capital of Burkina Faso for these network meetings, we were able to interrelate on many occasions and in different (social) settings. Notes were made during and immediately after the observations and meetings.

We also analyzed the content of messages posted on online discussion groups used by the advisors (“E-Groups”). For this purpose, we made use of two coding schemes: one to examine the type of interaction in the networks (based on Gunawardena, Lowe, and Anderson, 1997) and the other to assess the amount of task versus non task related messages posted on the discussion board (Veerman and Veldhuis-Diermanse, 2001). The

results indicate how the various networks are used (see appendix I). The analysis covers only a selection of networks to which we had access. We were not able to analyse the networks in the region of South America as we were unable to translate the Spanish messages.

In addition to these data we also made use of organization reports, minutes and policy documents as well as the results of a descriptive survey that we conducted under commission of TDO (N= 475, response rate = 53%), in order to get more background information.

Triangulating these different data sources served to assert the convergent validity of our analysis. Our findings have been reported back to TDO, both during a management meeting at the head office and during regional meetings in various countries. TDO advisors and management indicated that our findings correspond with their personal impression of the dynamics related to the knowledge networks, affirming the communicative validity (Sandberg, 2005) of our results.

For the interviews, survey and logfiles, we used a global perspective, spreading our attention over all 22 NOPs. An overview of collected data per network can be found in appendix II. We will use the survey, log file and interviews only to describe the networks in general terms and use the interviews and observations made during the visit at Burkina Faso to give more detailed insight in the networks' dimensions and dynamics.

TDO'S NETWORKS OF PRACTICE

TDO is a development organization active in five regions: Balkan, Latin America, Asia, West and Central Africa and East and Southern Africa, representing approximately 30 countries. Starting as a voluntary aid organization focusing on helping the poor by e.g. building irrigation systems, TDO has evolved into a professional consultancy organization with about 950 employees. It has adopted the routines and rhetoric of the consultancy industry, referring to employees as advisors, organizing the work into 'Practice Areas' (PA) and communicating its mission as 'developing capacity'. In practice, TDO's employees advise local organizations such as non-governmental organizations (NGOs) and local government agencies on issues related to specific development-related topics, such as Poverty, Drought, Deforestation and Aids. The work of TDO advisors is highly knowledge-intensive and diverse. For example, to help municipalities manage their communal waste

collection and transfer, advisors need know-how on institutional development (dealing with local governments, partnership building, client management, and advisory skills) on the one hand and thematic knowledge about their specific practice areas (e.g. Poverty, Local Governance, Tourism) on the other. Notwithstanding their different practices, TDO employees are bound together by their strong commitment to poverty alleviation.

In line with the image of a professional consultancy firm, TDO decided to implement knowledge networks or NOPs around the different practice areas in the region with the aim to leverage the knowledge potential in the organization. In addition to the function of so-called “practice area leader” or PA leader, referring to managers responsible for a practice area in one of the regions, TDO also created the role of “network leader” who is responsible for the functioning of the network. As opposed to PA leadership, network leadership is said to be a ‘role instead of a function’ meaning that network leaders have no formal authority in the networks.

At the time of our study, 22 formally supported NOPs existed covering the various practice areas active in the various regions (see appendix II). NOPs have an average of 47 members and each member has access to the E-Group of the network. The average membership duration at the time of study is 1.5 years.

The survey results indicate that the networks facilitate knowledge sharing through different media: on average 43% of the communication takes place via the E-Groups, followed by e-mail (31%), face-to-face- meetings (18%), telephone (6%) and skype (3%). The survey results furthermore indicate that members spend on average 11 hours a month on the E-Groups, half of which is spent on observing what is going on in the network, 12% on asking questions, 18% on answering questions and 20% on providing unsolicited information, such as posting a document.

In order to provide a better understanding of the actual practices and dynamics in TDO’s NOPs, we will first zoom in on three networks of which we were able to collect substantial data during our visit to Burkina Faso: Poverty, Drought and Forestry, each active in West and Central Africa. Next we will zoom out to unravel the three dimensions related to NOPs, after which we zoom in on the three networks again in order to show in more detail, how the three dimensions relate to each other and knowledge sharing in NOPs.

Zooming in: A tale of three networks

As the *Poverty network* started in 2004, a network leader was appointed to facilitate the activities in the network and on the E-Group, which was created to enable virtual knowledge sharing. Until that time, advisors had worked more or less isolated from each other in small local TDO offices with little contact with either head office or colleagues in the region. Via its E-Group the network connects its members with colleagues in the field. The network aims to stimulate knowledge sharing about poverty issues among advisors working on these issues in West and Central Africa and to prevent unnecessary redundancy. For example, a potentially relevant topic for discussion is how to influence the cashew nuts value chain to ensure honest and sustainable income to all partners involved, from farmers, cleaners, and shop owners to the regional cashew markets and exporters. Since the PA leader considered this (virtual) contact as a chance to steer the network more into the direction of the general organization strategy, he became increasingly active in the network, for example by giving assignments to the network members.

As a result of these managerial interventions, communication via the E-Group is mostly related to organizational strategic issues and tends to peak around yearly meetings when assignments need to be handed in. Members hardly use the E-Group to discuss daily activities, but rather use it as a broadcasting tool to stay informed about more general and formal issues related to their practices. The network has 36 registered members, of which about one third is inactive. Considering the fact that Poverty is the biggest practice area in the region, this is a relatively small number of active members. Nonetheless, this small number of active members generated a substantial number of messages over time, indicating that the Poverty network only serves the interest of a small group of people. For more details on the online interaction we refer to appendix I.

Members of the *Drought network* in West and Central Africa work for example on pastoralism, concerned with shepherds wandering around pastures, often crossing many geographical borders. In order to help these groups, advisors need to cooperate with colleagues in other countries and even other regions. This resulted in advisors from other regions, such as East and Southern Africa, joining the network as well. The E-Group helps to establish these contacts. The network members have appointed their own network leader and intensively share knowledge around operational issues, closely related to what they

face in their daily advisory practices. Formal face-to-face meetings with all members take place annually, although sub-group meetings are held more often. Most members have therefore met each other and know whom to contact when a certain issue arises. They use their E-Group as a mailbox to discuss issues now and then, but most knowledge sharing occurs outside the E-Group. The network leader works in close collaboration with TDO's manager responsible for this PA, to identify and elaborate on possible issues in the network that could be of relevance to TDO. As such, formal management does not exert influence on the activities of the network but is remotely involved to scan which issues that are discussed by the members require broad attention or formal action. Over time, the Drought network has grown into a large NOP with 70 members, of which almost half is inactive.

The *Forestry* network started in 2004 with the appointment of a network leader, the opening of an E-Group and by inviting forestry advisors to join. One exemplary forestry project concerns lumberjacks cutting trees on a mountain. Although cutting trees is of vital importance to the lumberjacks, both farmers growing crops down the hill and farmers on top of the mountain face its downsides as their fields flood when it rains or as they face difficulties with erosion and drought. Forestry advisors tend to have a strong local focus as they regard their local practices to be too specific for more global knowledge sharing. Hence, forestry advisors neither have contact with forestry experts at other locations nor feel the need for it. TDO nonetheless decided to install forestry networks; with the hope that more global sharing would occur. The freshly appointed network leader started with organizing the first and only network meeting which about 10 of the approximately 20 forestry advisors from West and Central Africa attended. During that meeting the network leader determined four main topics that he deemed to be important to discuss in the future. The members were however not interested in these topics and hence they induced little discussion.

Network members mainly rely on the E-Group for their communication. The absolute majority of the postings contain formal documents such as papers for conferences, information about courses, external reports, policies or plans. The main contributor to the network is a forestry expert located at head office who acts as a global knowledge broker for forestry issues and who is, together with the network leader, responsible for 73% of the messages. Besides document sharing, little interaction between members occurs (see

appendix I). After the unsuccessful network meeting event, the network leader was clueless on what to do to revive the network and stopped his initiatives to organize the network. The peak in network activity (see figure 5) can be explained by a formal project for which the E-Group was used as a database for work documents, which again demonstrates the functionality of the online network in terms of broadcasting system more than knowledge sharing and generating tool.

Zooming out: Analyzing the three dimensions

After details about the purpose and activities of the knowledge networks at TDO, it is time to address the questions that guide our research: (1) what do the dimensions of practice, social context and organization imply in the context of distributed knowledge sharing, and (2) how do they relate and contribute to more sustainable value of NOPs for knowledge sharing purposes? The first question calls for unpacking the rather broad dimensions of practice, social context and organization. Our empirical findings provide more insight into the content of these dimensions, and reveal different dynamics within them, based on open coding. This analysis subsequently enables us to address the second question in the next section, providing insight into the interrelatedness of these dimensions and their relationship to value generation in NOPs.

Practice dimension

Table I summarizes the analysis of the interviews related to the practice-based dimension. From this analysis, two important second order constructs emerge: *common practice* and *relevance to practice*. These second order constructs refer to conditions for knowledge sharing in NOPs that are mentioned during the interviews. Together they create the first order construct: ‘Embeddedness in Practice’, referring to the extent to which the activities of NOPs contribute to local practices of individual members. Below we will discuss these constructs in more detail.

INSERT TABLE I ABOUT HERE

The extent to which the network activities relate to the daily practices of individual members is not a given. For example, within the practice area Poverty, members greatly vary in terms of their knowledge interests. Some work on value chains for cashew nuts, others on milk farmers, yet others on tourist industry, resulting in different backgrounds, problems, legislations and clients. As a consequence of these diverging practices, some members feel they have not much to share with their fellow network members. Even though fully homogeneous practices can never be assumed due to diverging backgrounds and work experiences (Amin and Roberts, 2008), the different local contexts in which the members work hinder the ability and motivation to share knowledge even more. Consequently, the topics discussed in the network are often considered less valuable to the local practices and the networks are considered to have too broad a scope as the following interviewee notes:

“I don’t want to talk about market access for the poor, I want to talk about small farmers, value chains, how to value organic certifications or free certifications”
(interviewee 24, Poverty advisor, Latin America).

The extent to which network members perceive their practices to be common can differ from what formal management perceives to be a common practice - as Hildreth and Kimble (2004) also noted. Many (28/35) interviewees refer to the importance of *common practice* for the network to be used for knowledge sharing purposes. A large group of interviewees (24 out of 35) refers to the degree in which the activities are perceived as *relevant to their daily practice*, as an important condition for knowledge sharing. This condition is often considered problematic as TDO tends to push the boundaries of the daily practices towards a more abstract organizational level by forming the networks around formal practice areas. These formal networks overrule the networks’ embeddedness in practice (Brown, 1998). Although the importance of embedding knowledge management systems in the local practices of the users in order to be accepted has been reported before (Hsiao et al., 2006; Pan and Leidner, 2003), the importance of knowledge being relevant to local practices in geographically dispersed organizations has not received much attention in academia yet. This might be explained by the dominance of practice-based KM studies related to co-located COPs, in which social interaction around common local practices is the central unit of analysis.

Decreased embeddedness in practice negatively affects networks members' absorptive capacity (Cohen and Levinthal, 1990), in particular their ability to assimilate new knowledge, as the knowledge shared in the network becomes less strongly related to members' own experiences, problems and situations. This creates an interesting dynamic within the practice dimension: the less relevant the knowledge shared within the network is for members' local situation, the less they are inclined to contribute to knowledge sharing. When people do not contribute to knowledge sharing, no common practices can be created and neither can activities be assimilated in local practice. Like the following advisor notes:

"It is matter of give and take, if the network does not deliver anything that advisors can use, they will not contribute to it"

(interviewee 6, Poverty advisor, Asia).

This would also work the other way around: as embeddedness in practice increases, and knowledge can more easily be assimilated into members' local situations, they will be more inclined too contribute. As pictured in figure 1, this practice-based dynamic can thus both have a self-reinforcing or -deteriorating effect, leading to either more or less embeddedness of the network in the practices of the individual members.

INSERT FIGURE 1 ABOUT HERE

Social dimension

Table II provides a summary of the analysis of the interviews related to the social dimension. This dimension primarily concerns the perception of being embedded in a larger network, which can be labeled social embeddedness, defined as 'the network of interpersonal relations in which behavior is embedded' (Granovetter, 1985, p. 504). With the 'Social Embeddedness' of a network we thus refer to the extent to which NOP members are rooted in interpersonal relations. In line with social network theory (Gulati, 1998), two second order concepts emerged from this analysis: *structural embeddedness* and *relational embeddedness* – both of which we further divided into third order concepts.

INSERT TABLE II ABOUT HERE

As for *structural embeddedness*, half of the interviewees refer to the importance of TDO's networks in connecting people who used to work rather isolated. As Olivera (2000) noted regarding electronic bulletin boards, especially through the E-Groups it becomes possible to get to know colleagues working on similar issues in the region and to find out who knows what and where they are located. Creating such ties is often considered essential for advisors to share knowledge within the regional practices. 'Knowing who knows what' is an important condition for knowledge sharing in networks (Bock et al., 2005; Griffith, Swayer and Neale, 2003; Hollingshead and Brandon, 2003; Kotlarsky and Oshiri, 2005; Nahapiet and Ghoshal, 1998; Wasko and Faraj, 2005). Apart from making knowledge sharing more efficient, it also strengthens the feeling of being part of a larger network and helps to overcome a feeling of being isolated.

"What I see and hear is that our advisors are finally talking to each other. That might sound like a small thing, but it is a huge step forward. For a group with a 40-year old history of working on a small island on desolated parts of the world, who seldom or even never talked to one another. That is a moral benefit, you are no longer alone, you don't have to reinvent the wheel on your own, and you have a place to go to with your sorrows and your ideals, or just some questions"
(interviewee 7, head office, strategy unit).

Half of the interviewees also referred to the importance of *relational embeddedness* for knowledge sharing, which emerges from a combination of conditions such as feelings of trust, identification and the obligation and expectation of reciprocity (Nahapiet and Ghoshal, 1998, p.254-256). In line with theories on social capital and knowledge sharing (Adler and Kwon, 2002; Nahapiet and Goshal, 1998) relational embeddedness was mentioned as an influence on the opportunity, motivation and ability to share knowledge in the network.

As strong relations are regarded by both management and members as one of the main conditions for sharing expertise with fellow network members, many initiatives in the

network are undertaken to increase the level of social embeddedness. For example, network leaders start with a kick-off meeting where members introduce themselves and their work experiences. These social interactions as well as the online knowledge sharing help creating a common past history, increasing both the structural and the relational embeddedness of the network, which in turn stimulates participation in the network. Next to this, there are accounts of networks where a lack of social embeddedness frustrates initially enthusiastic members to continue sharing their expertise with their colleagues as they feel they take more than they give:

“There was a small core group actively contributing, but which did not receive anything in return. At a certain point you see frustration emerging and then these people started to withdraw. If there is no commitment you will see the network slowly falling apart”

(interviewee 6, Poverty advisor, Asia).

Consequently, we find an interesting internal dynamic within the social dimension. There is a mutual relationship between social embeddedness and knowledge sharing within the network, which can be both self-reinforcing and deteriorating. For instance, knowledge sharing in networks influences the transactive memory (Hollingshead and Brandon, 2003) in the network in the sense of knowing who knows what, how to reach these people and the feeling of being connected to others. This structural embeddedness influences network members’ motivation to share knowledge. Likewise, knowledge sharing influences relational embeddedness in terms of feelings of reciprocity, trust and identity (Vaast, 2004) – which, in turn, influences the motivation to share knowledge. The dynamics within the social dimension thus lead to either an increasingly or decreasingly socially embedded network. Figure 2 pictures this social network dynamic.

INSERT FIGURE 2 ABOUT HERE

Organization dimension

Table III presents a summary of the analysis of the interviews related to the organizational dimension. The complexity of this dimension, invariably linked to our focus on intra-organizational NOPs, is underscored by the large number of concepts emerging from the data. Two second order concepts emerged that will structure our discussion of this dimension: *organizational involvement* and *organizational learning*, each divided into third and fourth order concepts. Together they create the first order construct: ‘Organizational Embeddedness’, referring to the extent to which the activities of the network contribute to the formal organization in the form of organizational learning, stimulated by organizational involvement.

INSERT TABLE III ABOUT HERE

As for *organizational involvement*, TDO is mainly involved in the networks by providing support and exerting control. Since TDO’s knowledge networks are the result of managerial decision making, TDO’s head office *formally supports* the networks’ activities. Budgets are assigned to organize meetings or hire moderators and ICT infrastructure is provided by means of the E-Groups. Network leaders are formally appointed and can spend about 30% of their time on these network activities. This management support notwithstanding, members are not supported by means of extra time and half of the interviewees report lack of time to participate. Especially since TDO members are held accountable for every advisory hour – conform the consultancy industry- , people often give priority to their billable hours instead of spending time on knowledge sharing in networks. In line with this perceived (lack of) support, the extent to which formal management actively encourages participation, acknowledges the importance of the networks, or is being involved in the networks themselves are all ways in which management can support (or hinder) people’s participation in the networks. In terms of *organizational control*, formal management tried to ensure ‘return on investment’ by exerting control over the networks. While the initial aim of the networks was to share knowledge and learn from each others’ experiences in order to improve the services to clients and to prevent ‘re-invention of the wheel’, soon

after their introduction, top management decided that networks should also contribute to the organizational strategy related to the practice areas. They thus try to exert more control over the content of the network, through influencing the agenda of the network, for example by determining topics for discussion. Many interviewees (20/35) mention this agenda setting behaviour by management and mainly perceive it as negatively influencing knowledge sharing. Moreover, various networks, as Poverty illustrates, are asked by TDO management to deliver specific output such as writing strategy papers or delivering an intervention strategy, as one expert from the log files illustrates:

“In brief: apart from the present activity descriptions, I ask you to prepare a strategy or positioning proposal for your country, based on a quick and dirty analysis regarding the service areas that are not yet covered by TDO in your country. These proposals will be discussed and used as input during the first two days of our workshop”

(PA leader, Poverty).

Formal management also exerts influence on the networks by determining their aims, goals, directions for the network or by making decisions about network leadership or the way things are done in the network. Some interviewees perceive controlling the network to some degree as beneficial for knowledge sharing as it gives focus to the activities and helps to generate sufficient activity to derive value. Ultimately too much managerial intervention is considered to damage the drive to participate as people feel the network is no longer a supportive vehicle but rather a place where extra work is assigned. Organizing the networks thus indeed involves a management paradox as described by Hislop (2005). Opposed to COP literature, in TDO's NOPs one cannot rely exclusively on motivational drivers for the networks to flourish. Support seems to positively influence the motivation to contribute to the network, whereas too much involvement in terms of control diminishes this motivation. Organizing NOPs thus involves balancing between organizational structuring and the practices of the members (Thompson, 2005).

Next to organizational support and control, the organizational embeddedness also relates to the degree to which the organization as a whole is able to *learn* from the knowledge shared in the networks, referring to the relevance to the organization. More specifically, management hopes to institutionalize knowledge being shared in the networks

in for example new routines, guidelines, procedures, strategies or best practices. Crossan et al. (1999) identified institutionalizing the outcomes of individual and group learning as one of the key processes leading to organizational learning. According to these authors institutionalization has occurred if prior learning becomes embedded in the organization and begins to guide the actions and learning of organizational members (p. 529). In reality the level of organizational learning in TDO is quite disappointing as the following interviewee notes:

"Whether that [bringing advisors together in the networks MA] is effective... Then more should come out of the networks than has happened so far. You must have heard about our practice-area drill held last year. The quality of that, well, to put it very mildly, was not optimal. In the end, I think the groups did not succeed to come up with manageable strategies. We have analyzed this whole process and the outcomes are exemplifying for this. So yeah it is very good that people sit together (...), but it has not been fruitful yet"
(interviewee 15, head-office, strategy unit).

This description of the organizational dimension again points to an internal dynamic. Organizational involvement by providing support or by controlling the network influences knowledge sharing in networks, positively and negatively respectively. At the same time, they can be considered as conditions to support organizational learning, influencing the extent to which the network activities are embedded in the formal organization. A simplified reproduction of this organizational dynamic can be found in figure 3.

INSERT FIGURE 3 ABOUT HERE

So far, we have revealed the various elements constituting the three dimensions. A more in-depth analysis points out that they are all related to specific internal dynamics within the dimensions we distinguished: a reciprocal relationship between knowledge sharing on the one hand, and (1) practice, (2) social context and (3) organization on the other. As these dynamics are either self-reinforcing or -deteriorating in nature, the conclusion would be

that, by themselves, these dynamics would ensure that networks either increasingly or decreasingly become embedded on three levels: embedded in practice, socially embedded, and organizationally embedded. These different forms of embeddedness positively influence the inclination to share knowledge. Conversely, lower levels of embeddedness would lead to less knowledge sharing.

The second question that guides this research has not yet been addressed: how the three dynamics discussed relate to each other and how they might contribute to more sustainable use and perceived value of NOPs for knowledge sharing purposes. In order to address this question, we need to take a closer look again at the three selected networks.

Keeping the wheels turning: Interrelated dynamics in Networks of Practice

The perceived success or failure of a network is frequently discussed in the interviews and observations. Although the word *value* is easily used, the question remains what value actually entails and for whom it is generated. The results indicate that value can emerge on three different levels related to the three types of embeddedness:

- On an *organizational level*, for example by institutionalizing the results of learning in the network into the TDO organization;
- On a *social network level* by means of an increased level of connectivity amongst the advisors;
- On the *level of individual practices* by means of assimilating the network's activity in the local practices of individual members.

The extent to which value is generated in a NOP seems to depend on the dynamics within each of the three dimensions. However, our results also indicate that these dynamics are interrelated. For instance, management's push towards strategy formulation (organization dimension) decreases the embeddedness in practice of the activities in the network (practice dimension), instigating a deteriorating dynamic in both dimensions for the networks involved. On the other hand, the organizational support for the networks activities affects the development of social embeddedness by enabling meetings and virtual meeting places, leading to reinforcing dynamics in both the social and organization dimension. Likewise, our description of the Drought network shows how self-reinforcing social and practice dynamics can mutually influence each other. This finding supports literature on economic

and social geography which increasingly points at how relational proximity can arise from interaction around common practices, thereby decreasing the importance of spatial proximity for knowledge sharing (Amin and Cohendet, 2004; Amin and Roberts, 2008; Gertler, 2003). In other words: “*where practice is common, communication can be global*” (Brown and Duguid, 2001, p.205). Consequently, the dimensions heavily influence one another. By way of a metaphor, the dimensions can be conceptualized as cogwheels as shown in figure 4.

INSERT FIGURE 4 ABOUT HERE

Self-reinforcing dynamics within one of the dimensions would speed up the cogwheel, whereas deteriorating dynamics would slow it down. These cogwheels are connected to each other, and thus influence each other as well. In other words, the dynamics within one dimension can reinforce or deteriorate the dynamics within one of the other dimensions. This system of cogwheels could achieve *momentum*; that is a drive to sustain itself (McDermott, 2000; Morris, Bessant and Barnes, 2006). In more concrete terms, a network that achieves momentum is a network that is able to sustain its activities and to deploy sufficient activity to derive value from it.

To illustrate how these dimensions relate to each other and to network momentum we will again zoom in on the Poverty, Drought and Forestry network in West-Central Africa in order to provide a more detailed account.

Wheels in motion: Three networks revisited

To put it in extremes, the *Poverty* network is often referred to as being troublesome and with a moderate level of momentum, the *Drought* network is perceived by its members and by management as a valuable network and generates a lot of momentum while the *Forestry* network plays a marginal role for both formal management and the members and lacks momentum.

From the beginning, management has been highly involved in the *Poverty network*. The practice area leader determines topics for discussion and gives assignments to the network. Little attention is paid to social issues and network members do not share concerns, help each other with local problems or identify with each other. We observed little interaction during the meeting and members do not seem to know each other (well). Prior to a meeting, members have to hand in assignments. These tasks result in temporarily high interaction on the E-Group. Figure 5 shows that during the months following the introduction of the network, activity has been relatively high but interaction strongly declined after an assignment (e.g. deadline June 2006) was fulfilled or after the network meeting (December 2004) was over. Discussing practical day-to-day issues is not considered sufficient for having a valuable network by TDO. Combined with the strategically oriented agenda, members do not consider the network activities as helpful for their local practices, resulting in a deteriorating dynamic in the practice ‘wheel’.

INSERT FIGURE 5 ABOUT HERE

Halfway 2005, both the practice area leader and the network leader of the Poverty network were given other responsibilities, leaving the network without any form of organizational control. From that point on, the network activities almost ground to a complete stop, as there was no stimulus left for interaction. The few new members that later joined the network observed inactivity on the electronic discussion groups and considered the network to be of little value for their daily work. This evoked the practice area leader to reveal us on the night before their network meeting (June 2006) that TDO wanted to withdraw support if he could not turn the tide.

The Poverty network exemplifies how one strong ‘wheel’: the organization dimension, can compensate for weaker ones (the practice and social dimensions), but also signifies the vulnerability of such functioning as a decrease in organizational dynamics obstructed the complete system of wheels.

The activities in the *Drought network* in West and Central Africa are fully determined by the advisors. Discussion consequently always takes place around members' common practices. To prevent losing general relevance, temporary sub-groups often emerge around themes in which more specific meetings and discussion can take place. Most members enjoy talking with other colleagues in the same field and their common practice makes them feel related. Members enthusiastically welcomed each other on the observed meeting and interacted a lot both during and after the meeting. As participation also helps them in their daily work, they are strongly motivated to participate in the network. Although formal management does not exert influence on the activities of the network, they are remotely involved in order to detect issues that could be institutionalized in the formal organization. Participation is not formally evaluated or supported by explicitly making time available, but is encouraged and deemed important. In this network, all three wheels showed a positive dynamic, creating momentum for the whole network.

The *Forestry network* faces major difficulties getting any of the wheels running. In spite of the small number of advisors working in the field, most members are not familiar with each other, neither do they feel related or feel a need to interact. They do not recognize how the network could support them in their daily work and consider their practices too local to discuss on a regional level. The advisors are not the only ones failing to see the potential value of such a knowledge network. Regional management is not involved in the network and fails to encourage advisors to participate. The only stimulus left comes from head office in terms of provided facilities and a central person posting globally focused forestry documents on the E-Groups. The lack of positive dynamics on all three dimensions in the forestry network de-motivates members to participate and accordingly the forestry network neither provokes sufficient activity to derive value. Even though the organizational wheel was slightly moving, no momentum was generated as all other wheels stood still.

DISCUSSION AND CONCLUSIONS

In the age of globalization, knowledge-intensive organizations are increasingly facing the challenge of how to organize knowledge sharing between geographically dispersed units and individuals (Becker, 2001). The traditional KM literature tended to address this challenge in terms of “knowledge transfer”, implying a conduit model of knowledge

sharing. The practice-based literature on knowledge and organization however has criticized this sender-receiver model of knowledge transfer and emphasized that knowledge is being created and shared where practices are shared in a rich and meaningful way. Within this practice-based tradition, Communities of Practice are often identified as effective vehicles to support such practice-based knowledge sharing. But since COPs typically consist of co-located people who work together on common practices, the concept of Networks of Practice (NOPs) becomes important. Similarly to COPs, NOPs refer to groups of people who engage in common practices - however, NOPs are larger in scale and not necessarily co-located. Therefore, a practice-based view on geographically dispersed knowledge sharing requires a focus on NOPs, more specifically intra-organizational NOPs – NOPs that are primarily involved in internal business processes.

Organizing intra-organizational NOPs is a major challenge for organizations. In practice, we see that more and more organizations try to introduce NOPs, but such initiatives often fail. Therefore, a more solid understanding of knowledge sharing in geographically dispersed settings is called for. This paper contributes to that understanding by identifying and unpacking the various dimensions that play a role in organizing such networks, as well as by providing insight into how these dimensions each have their own dynamics, and mutually influence each other.

Our findings indicate that organizing NOPs involves three dimensions: (1) practice, (2) social, and (3) organizational. Based on a unique in-depth case study, we have unpacked these three dimensions, and show how each dimension has its own dynamic, based on either reinforcing or deteriorating ‘forces’ that influence both knowledge sharing in a NOP and the embeddedness of the networks at three different levels: (1) embeddedness in practice, the embeddedness of network activities in the individual local practices, (2) social embeddedness, the network of interpersonal relations in which network members are embedded, and (3) organizational embeddedness, the embeddedness of the network in the formal organization. By introducing the metaphor of a cogwheel, we argue that maintaining valuable continuation of a NOP involves the dynamics of these three levels of embeddedness. Although our findings point at the difficulty of getting all parts of the cogwheel going, it helps both practitioners and researchers better understand the challenges and dynamics underlying distributed knowledge sharing.

Implications

Our theoretical contribution is threefold. First, we enrich the literature on knowledge management and NOPs by revealing the dynamic forces within three dimensions. These dynamics can both improve or deteriorate the value of NOPs, in terms of three levels of embeddedness:

1. *Embeddedness in practice*: the more knowledge shared in networks concerns common practices and is perceived as relevant to local practices, the more network members tend to share knowledge with each other. This process can be self-reinforcing, as the more people share knowledge, the more the knowledge becomes focused on a common practice. However, the process can also be deteriorating in the sense that the less knowledge is perceived as common and relevant to local practices, the less knowledge will be shared.
2. *Social embeddedness*: the more members are aware of who knows what in the network and the more the network is characterized by strong social ties, the more members will tend to share knowledge. Again, this process can be both self-reinforcing (more sharing leads to more awareness of who knows what and stronger social ties) and deteriorating (less sharing leads to less awareness and weaker ties).
3. *Organizational embeddedness*: the more organizations are involved in the network, the more knowledge is being shared and the more organizations are able to learn from what is being shared. Again, a process that can be both self-reinforcing (more sharing leads to more learning and thus more involvement) and deteriorating (less sharing, less learning and less involvement).

Our results seem to imply that more embeddedness is always better than less. Nevertheless, there are some potential dangers of a network becoming “too” embedded. A high degree of social embeddedness, for instance, could lead to group-think, ‘collective blindness’ and isolation from external sources (Edelman et al., 2004; Janis, 1982; Nahapiet and Ghoshal, 1998; Uzzi, 1997), inefficiency (Adler and Kwon, 2002) or conflict (Contu and Willmott, 2000; Fox, 2000; Handley et al., 2006;). Likewise, a network overly embedded in local practices might hinder organizational learning (Brown and Duguid, 2000). Too much emphasis on local practices could thus induce a ‘local learning trap’ (Huysman and de Wit, 2004) in which knowledge remains at the network level. In addition, it might reinforce the

development of fixed cognitive beliefs and ideologies (Veenswijk and Chisalita, 2007) leading to diminished creative and innovative capabilities. These ‘lock-in’ effects have been associated with communities of practice as well (Contu and Willmott, 2000; Fox, 2000).

Secondly, our results indicate that the three dynamics are interrelated and influence each other. By introducing the metaphor of a cogwheel, we argue that gaining momentum in a NOP involves the dynamics of three levels of embeddedness that are related with the three dimensions of NOPs. The either self-reinforcing or deteriorating dynamics in each dimension ensure that networks either increasingly or decreasingly become embedded. Since the three cogwheels are also connected to each other, they influence each other as well. Once the cogwheels keep on turning, the network has gained momentum on its own and thus valuable continuation of the network is achieved.

Finally, the notion of embeddedness of networks provides counterweight to the dominance of networks as the “the holy grail of KM”. While the practice-based perspective to KM brought to the forefront the importance of bottom-up COPs and NOPs where people find each other informally and share knowledge, the operational and commercial needs of managers and consultants yielded an appropriation of these ideas into practical solutions or functional tools to manage knowledge. After the *IT determinism* that characterized the first generation of KM (Scarbrough and Swan, 2001), these developments have given rise to a new form of determinism which can be labeled *network determinism*: the idea that implementing COPs or NOPs in itself leads to success in terms of learning and knowledge sharing – a sort of “if you build it, they will come”-attitude towards knowledge in organizations. This network determinism exemplifies the KM dilemma, and is not the result of implementing networks per se, but rather signifies a lack of attention to the importance of embeddedness of networks.

The practical relevance of our research lies particularly in understanding if and how exactly the three dynamics can be influenced in order to gain momentum in the network. In fact, our theory can be used to assess the feasibility of distributed knowledge networks. Although we need more solid research to confirm this idea, we believe that efforts to introduce NOPs that do not address these multiple dynamics will most likely fail to achieve momentum -keep the wheels turning, so to speak - and consequently be unsuccessful in the long run.

Limitations

A first and important limitation to our study concerns the level of generalization. We are aware of the fact that there might well be other conditions affecting knowledge sharing in NOPs that have not emerged in our particular study. Consequently, we are aware of the fact that the generalizability of our findings is limited – it is not our ambition to generalize to the level of other NOPs or organizations, but to the level of theory – what Yin (1989) refers to as “analytic generalization”. For such generalization, replication of our findings in different case studies would be necessary. Secondly, although the title of our paper refers to the challenge of organizing NOPs, we have not explicitly addressed issues concerning management or leadership. Both these issues (replication as well as leadership issues) should be addressed in future research. In the closing section of this paper, we will elaborate on suggestions for future research based on our findings.

Future research

Whereas the broad focus of our data collection enabled us to identify some general patterns in organizing NOPs, we urge for more in-depth, network-level data collection in subsequent research. The theoretical insights presented in this paper provide a promising direction for further research into the issue of organizing intra-firm networks of practice. For instance, longitudinal research could point out whether the importance of the three dimensions changes over time. In most networks at TDO, investments were first focused on increasing the social embeddedness of the network e.g. by organizing meetings. Previous studies already showed that focusing on social aspects is indeed an important starting point for creating well functioning distributed groups (Ardichvili, Page and Wentling, 2003; Jarvenpaa and Leidner, 1999; Kotlarsky, and Oshiri, 2005). We also have some indications that networks starting without organizational embeddedness were more successful in creating strong and committed groups serving the interests of the members than the networks who fully originated from the organizations initiatives. Future research could investigate the evolution of different levels of embeddedness and their effect on knowledge sharing in NOPs over time thereby helping to further the so far limited understanding of the evolution of social networks (Kilduff and Tsai, 2006).

Furthermore, studying multi-level embeddedness of networks calls for multi-method research. Besides the need for multiple methods, NOP research implies a different research approach than we tend to use when studying COPs. In the case of COPs, ethnography has proven a highly suitable research methodology to analyze situated learning. In case of NOPs, where situated participation is absent and where learning happens through combining knowledge developed in heterogeneous local environments, ethnography alone falls short of discovering the complexity and multiplicity of the distributed ecology of the network. Instead of situated learning, we believe that NOPs need theories related to ‘learning ecologies’ as once introduced by Levinthal and March (1991) when discussing the dynamics of organizational learning. The concept of learning ecology stresses the entangled learning experiences that influences and are influenced by network members who do not share the same practice and identity but do learn from each other’s experiences.

In conclusion, NOPs appear to be a highly promising form of organizing distributed knowledge sharing. However, they also pose a new managerial challenge that entails balancing the complicated dynamics identified in this paper. In order to get more insight into the exact nature of this challenge, and its possible solutions, further critical research in this area is called for. The ideas presented in this paper may well serve as a basis for such research.

NOTES

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Table I: Unpacking the practice-based dimension

First order	Second order	Definition	Exemplary quotes	Grounding (total nr references / (nr of single interviewees))
Embeddedness in practice	Relevance to practice	Quotations concerning the extent to which the network activities are immersed in the daily practices of members.	<i>“People want really practical, day-to-day, exchange. And especially because in our network it is not like; I have a problem in my daily work with a client or so and I bring it to the network . So yeah it is not that useful”.</i>	76 (28)
	Common practices	Quotations concerning the extent to which the network members have the same practice.	<i>“People must be interested in the themes, they are working in a certain PA, but inside the PA a lot of different things happen. People can be interested in only a certain specific thing going on in the PA (...).</i>	54 (24)

Table II: Unpacking the social dimension

First order	Second order	Third order	Definition	Exemplary quotes	Grounding (total nr references / (nr of single interviewees))
Social embeddedness	Structural social embeddedness	Know each other	Quotations concerning the extent to which members are connected to one another.	<i>“ So we said, okay - it is very important to get together, to get to know each other, because there are new people joining continuously”</i>	35 (18)
		Know who is where and knows what	Quotations concerning the extent to which members know who knows what in the network and how to reach these people.	<i>“That is one benefit of such a network; we now know who is where and what is happening and who knows about what”</i>	20 (11)
	Relational social embeddedness	Group- feeling	Quotations concerning the extent to which members feel they belong to the same group.	<i>“That is a psychological benefit, you are no longer alone, you don’t have to reinvent the wheel on your own, you have a place to go to with your sorrows and your ideals, or just some questions”</i>	24 (13)
		Trust	Quotations concerning feelings of safety and trust in the network.	<i>“People feel it’s difficult to write things down anyway because they fear that everyone will jump on them.”</i>	26 (15)
		Reciprocity	Quotations concerning the willingness or eagerness of network members to help other members in the network.	<i>“People are not always that active; they don’t think: ‘This is someone’s problem, I will help them solve it’ - they don’t do that”.</i>	13 (9)

Table III: Unpacking the organization dimension

First order	Second order	Third order	Fourth order	Definition	Exemplary quotes	Grounding (total nr references / (nr of single interviewees))
Organizational embeddedness	Organizational involvement	Organizational support	Budget	Quotations concerning the budget provided by formal management for the network activities.	<i>“We gave a financial impulse to all the networks. We made about – euro available to invest in meeting each other, to do studies, to hire moderators if necessary”.</i>	24 (12)
			Time	Quotations concerning the extent to which time is (perceived) to be available for network activities.	<i>“The first [barrier] was the focus that knowledge networks were a part-time responsibility, a minor part of people’s jobs, the second barrier was that the advisors’ targets (...), put them under immense pressure not to spend time on knowledge development and knowledge brokering”.</i>	31 (17)
			ICT infrastructure	Quotations concerning the ICT facilities provided by formal management for the network activities.	<i>[what needs to be done] “very simply to provide the right hard- and software to enable efficient virtual communication”.</i>	19 (14)
			Review network activities	Quotations concerning whether individual participation in the network is formally	<i>“It is a fact that it [knowledge exchange] is not being rewarded now. My colleagues here in Vietnam, they don’t get a</i>	13(8)

				being reviewed or evaluated.	<i>better evaluation; it does not deliver any direct benefits to them, if they talk to their colleagues in Nepal. Or.. maybe their advice work gets better but even that is not evaluated in TDO either”.</i>	
			Encourage participation	Quotations concerning the extent to which the formal management encourages participation in the network.	<i>“Some are just very strict line managers, and they prefer to keep everything internal and under their control, so they don’t encourage their advisors, whether they are senior, medior or whatever, not to, you know take initiatives and such”.</i>	26 (16)
			Acknowledge importance of network	Quotations concerning whether formal management acknowledges participating in a network as an important activity.	<i>“That [knowledge exchange] is being appreciated too little by the head office, as a valuable function of such a PA network. (...) There is too little company respect for it”.</i>	17 (10)
			Engage in network	Quotations concerning whether formal management is involved in the network themselves.	<i>“A few weeks ago, we had a face-to-face meeting with all advisors in a country and we invited the network leader of Latin America. He explained what the network is and what it stands for, how things are going</i>	32 (19)

					<i>and what our ambitions are. He also gets feedback from the advisors how they experience things or what has added value to them”.</i>	
		Organizational control	Steer agenda of the network.	Quotations concerning the steering of discussion topics by formal management.	<i>“Following that, we gave all issues that came up from TDO corporate a place on our agenda. And are people committed to these things? Obviously not”.</i>	40 (17)
			Demand specific output	Quotations concerning whether formal management demands specific output or results from the network.	<i>“Well, I just wanted very concrete results. So I just said, I want each country to show me how you are going to reach 10,000 families, and how you are going to generate an extra income of 1,000 dollar a year per family, over a period of five years and in a sustainable way”</i>	26 (12)
			Actively controlling the network activities	Quotations concerning the active controlling the networks by formal management.	<i>“At a certain point in time there was a call from the directors to close that thing, to end it; all those networks that were just emerging. I said, no you should stimulate that. It’s good. You must stimulate that, but you should also give it direction. Or</i>	42 (20)

					<i>make sure that they choose direction themselves.”</i>	
	Organizational learning	Institutionalization		Quotations concerning whether the outcomes of the network can be applied in the formal organization in e.g. rules, routines, strategies etc.	<i>“And that output has been incorporated in what we finally called the regional intervention strategy for local governance.”</i>	27 (14)
		General value of results/output		Quotations concerning general statements about the value of the networks’ outcomes.	<i>“So in 2005 that [request to write strategy papers] was officially started, and that simply was not that successful. So the things that came out of that, August 2005, were actually not very good.”</i>	27 (15)

Figure 1: Individual practice-based dynamics

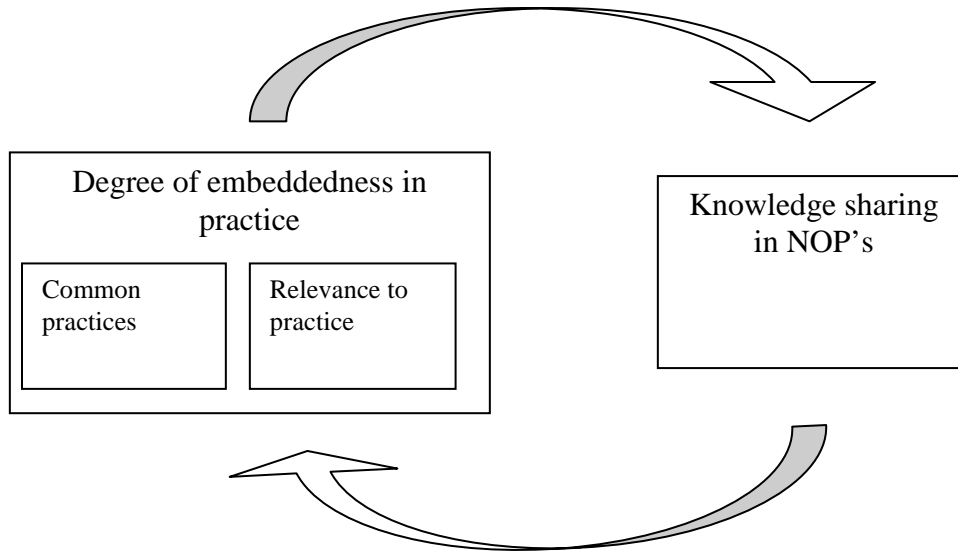


Figure 2: Social network dynamics

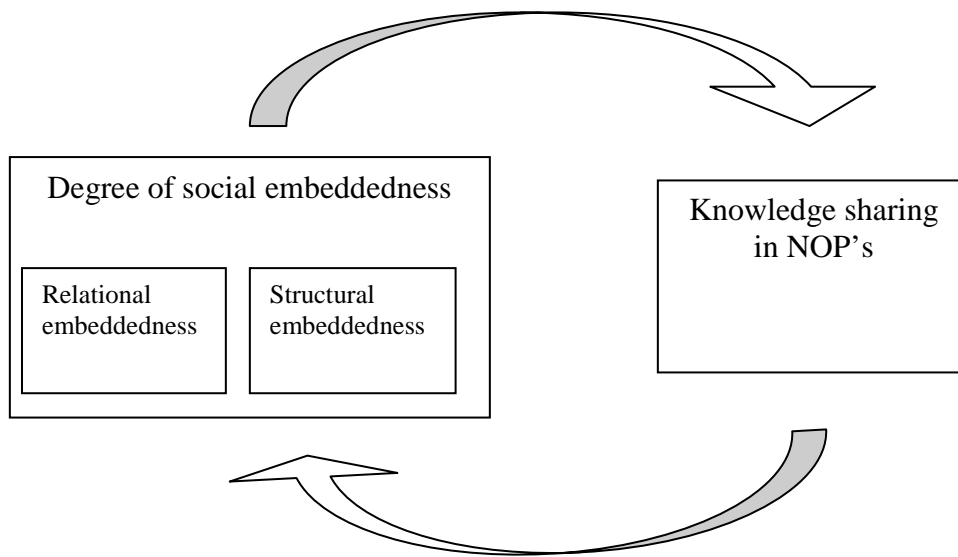


Figure 3: Organizational dynamics

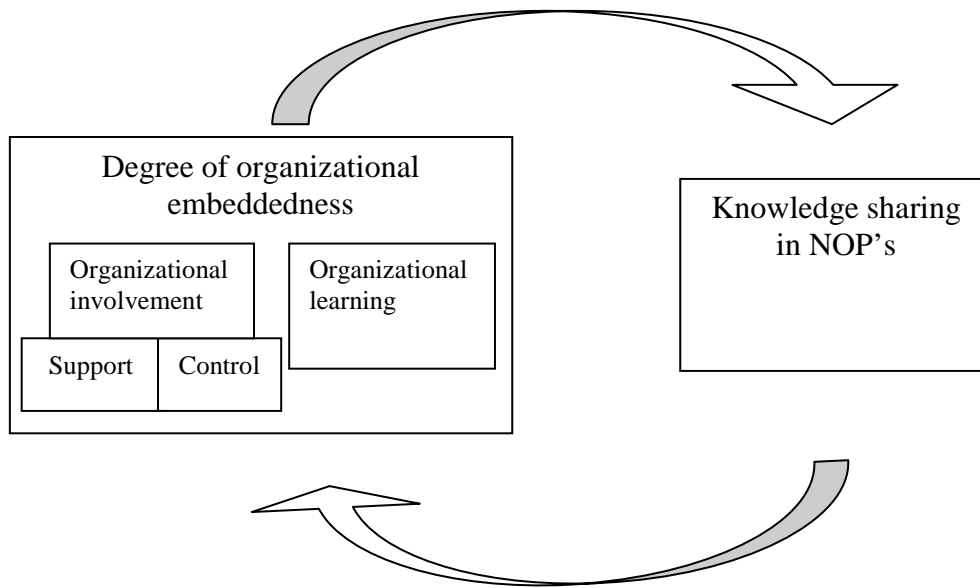


Figure 4: The cog-wheel of NOP dynamics

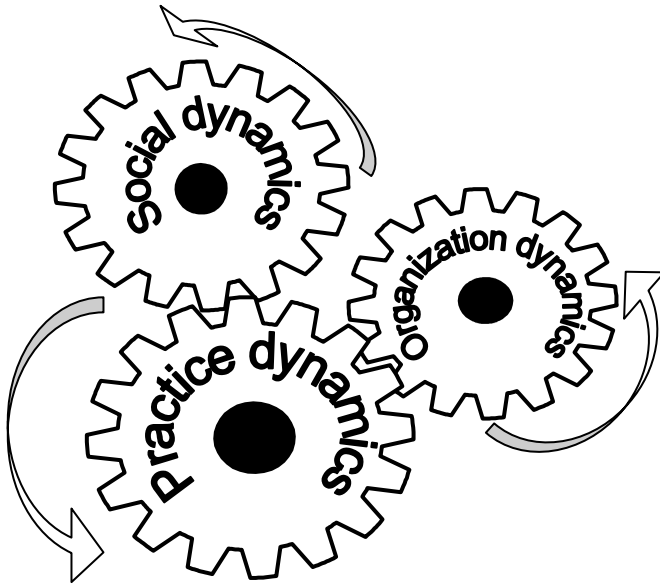
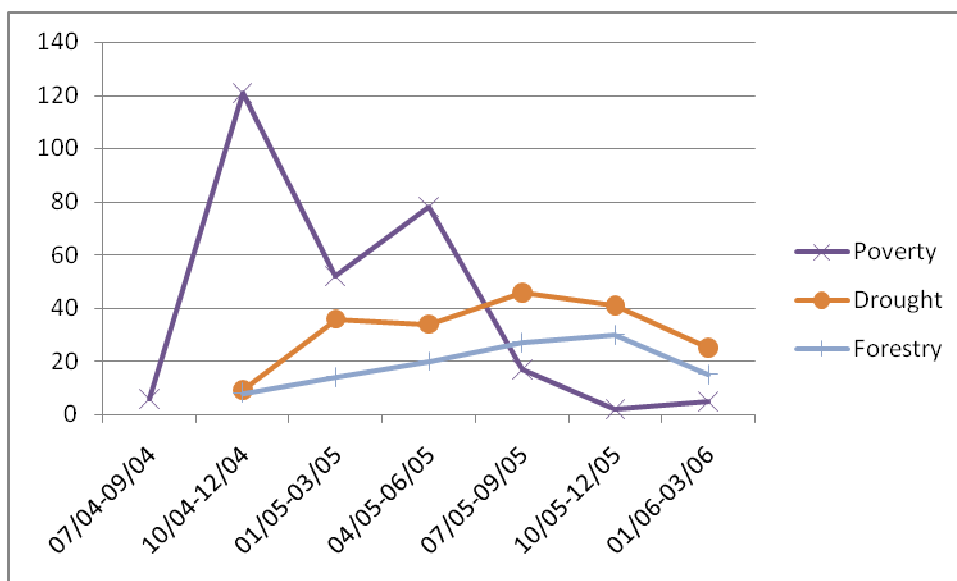


Figure 5: Frequency of E-Group use Poverty Network, Drought Network and Forestry network.



Appendix I: Results log-file analysis

	% replies on total nr messages	% inactive members	% Task oriented Messages	% non- Task oriented Messages	Type of information / knowledge sharing activities on E-Group ¹
Poverty Asia	34%	53%	65%	35%	46% Adding resources; 23% Opinions and experiences; 26% Agreement or clarifications.
Tourism Asia	43	31	58	42	46% Adding resources; 20% Opinions and experiences; 27% Agreement or clarifications; 8% Co-constructing ideas.
Drought West- Central Africa	46	52	74	26	31% Adding resources; 9% Opinions and experiences; 16% Agreement or clarifications; 34 %Negotiation; 9% Testing new ideas.
Poverty East- South Africa	42	73	59	41	34% Adding resources; 23% Opinions and experiences; 28 % Agreement or clarifications; 18% Co-constructing ideas.
Poverty West- Central Africa	56	31	58	42	25% Adding resources; 30% Opinions and experiences; 25% Agreement or clarifications; 11% Co-constructing ideas.
Forestry West- Central Africa	10	50	69	31	60% Adding resources; 27% Opinions and experiences; 9% Agreement or clarifications.
total	39%	48%	64%	36%	40% Adding resources; 22% Opinions and experiences; 21% Agreement or clarifications; 13% Co-constructing ideas.

¹ Only categories containing more than 5% of messages are reported

Appendix II: Collected data per network

Name of network	Collected data	Interviews with:	References to network in interview with:	Nr of posted messages (nr of members)
West-central Africa: Governance	Interviews, survey	Advisor	PA leader; Local manager; 2 Advisors; country director	392 (100)
West-central Africa: Poverty	Interviews, survey, observations, formal documents, log-files	PA leader	Regional Director; Local manager; Advisor	283 (36)
West-central Africa: Forestry	Interviews, survey, observations; log-files	Network leader	Local manager/ network leader	120 (18)
West-central Africa: Gender	Interviews, survey	Network leader; country director	Strategy unit	50 (45)
West-central Africa: Drought	Interviews, survey, observations; log-files	2 Advisors	Regional Director; Local manager; country director; Strategy unit	214 (70)
East-South Africa: Governance	Interviews, survey	Advisor		301 (85)
East-South Africa: Poverty	Interviews, survey; formal documents; log-files		Regional Director	204 (64)
East-South Africa: Tourism	Survey			89 (37)
East-South Africa: HIV/Aids	Interviews, survey	Network leader		66 (33)
East-South Africa: DRHA	Survey			73 (43)
Asia: Governance	Survey; formal documents			210 (58)
Asia: Poverty	Interviews, survey; formal documents; log-files		Regional Director	123 (55)
Asia: Tourism	Interviews, survey; formal documents; log-files		Regional Director	173 (63)
Asia: Forestry	Interviews, survey; formal documents	Former network leader Forestry/ Local manager; Advisor	Local manager / network leader	540 (39)
Asia: Biogas	Interviews, survey; formal documents		Regional Director	1 (3)
Asia: Water	Survey; formal documents			24 (14)
Latin America: Governance	Survey			75 (10)
Latin America: Poverty	Survey	Network leader; 2 Advisors	Regional Director; Local manager; / network leader	325 (85)
Latin America: Forestry	Survey; formal documents			674 (51)
Latin America: Water	Survey			250 (35)
Balkan: Governance	Survey			No E-Group use
Balkan: Forestry	Interviews, survey; formal documents	Local manager; / network leader		No E-Group use